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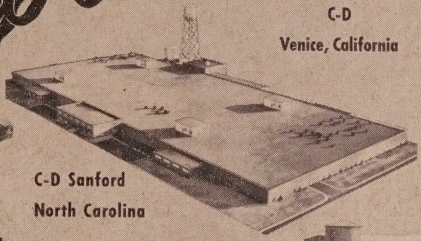

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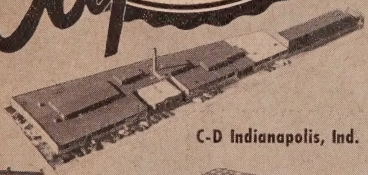

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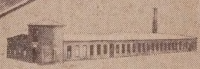

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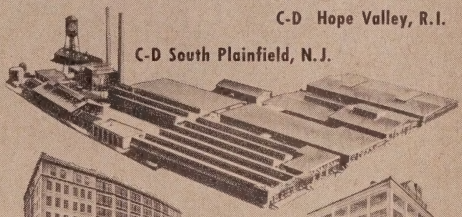

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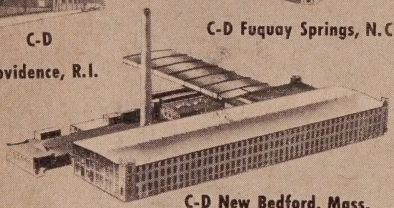

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Vol. 22 AUGUST, 1957 No. 8

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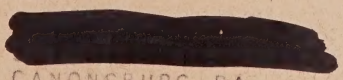

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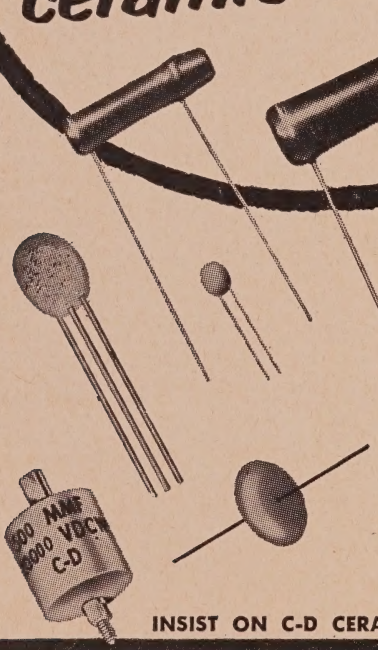

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NEW DEVELOPMENTS IN SEMICONDUCTOR DEVICES

With new circuits and devices appearing regularly in the semiconductor field, it is worthwhile occasionally to review certain of those developments which are of immediate practical interest. A great many of the advances described in purely scientific journals are chiefly of theoretical interest and often have only remote practical applications. The practical semiconductor technician finds most value in such information as can be applied immediately to the doing of new jobs or to the better accomplishment of old ones. This article describes a few such semiconductor developments.

Silicon Power Rectifiers

Advantages offered by new silicon power rectifiers are high operating current in small-sized units, higher peak inverse voltage ratings per cell than obtainable with selenium, low forward voltage drop, high temperature rating, and high maximum operating frequency.

A silicon rectifier cell 1⅛" in diameter and 1⅛" high, for example, has the following ratings: Maximum peak inverse voltage 300 v; average instantaneous forward voltage drop 1.3 v; maximum d-c output current in a 3-phase bridge circuit, with cells mounted on 5" x 5" x ⅛" cooling plates, 160 amperes with convection cooling at 30°C (350 amperes with forced-air cooling at 30°C and 30 amperes convection-cooled (75 amps forced-air-cooled) at 160°C; maximum operating temp. 160°C; maximum operating frequency 25 kc. Surge current rating is 1200 amperes (1 second) and 1,000 amperes (5 seconds) half-wave peak current. With other cells of different dimensions, maximum peak inverse voltage ratings up to 8,000 v are obtainable.

Lower-powered silicon recifier cells, 0.38" in diameter and 0.32" high, require no heat sink and have the following ratings: Maximum peak inverse voltage up to 600 v, average rectified current (at 100°C) to 350 ma, maximum operating temperature 150°C, 1-second surge current 10 amperes, forward voltage drop 0.75 v at 350 ma, and reverse leakage current 200 microamperes at 600 p. i. v.

Silicon power rectifiers offer high operating power ratings in small physical sizes and light weight, together with high-temperature reliability. Rectification efficiencies up to 99% are obtainable. Their extremely low forward dynamic resistance (a few thousandths of an ohm) and low forward voltage drop promote good regulation in power supplies. Silicon rectifiers may be used in all standard power supply circuits. Series-connected cells have been employed in units where the peak inverse voltage is 100,000 v.

Aside from d-c power supply applications, silicon power rectifiers are employed in magnetic amplifiers, servomechanisms, motor control circuits, voltage regulators, high-current relay operation, frequency multipliers, autopilots, arc suppressors, magnetic clutches and brakes, and alternator field circuits.

CORRECTION

The meter (M) in the circuit Fig. 8 on Page 8 of the June, 1957, issue of "The Capacitor," should be shown as a 0-1 DC AMPERE, not Milliampere.

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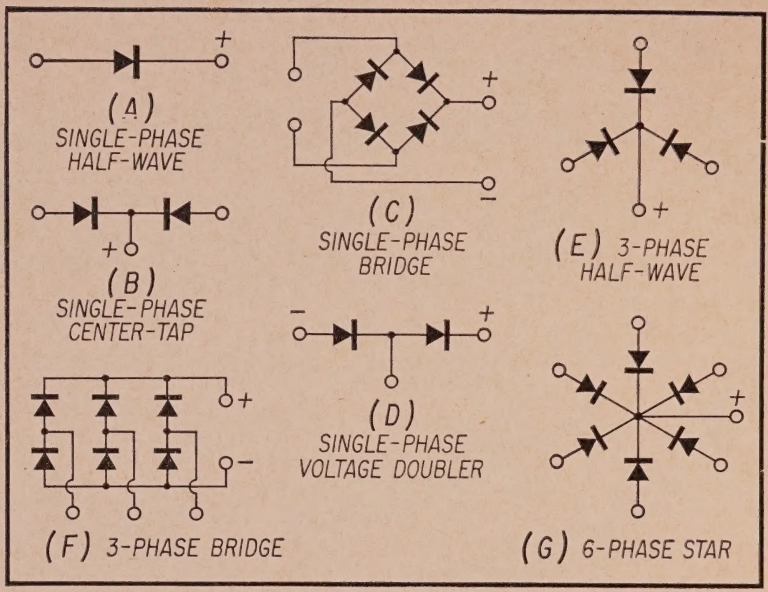

Fig. 1. Stack Configurations of Silicon Rectifiers.

Figure 1 shows the stack configurations in which silicon power rectifiers are commercially available.

High-Power Transistor Switch

One commercial power transistor (Delco 2N174) now is capable of switching d-c power up to 1 kilowatt. This opens a new field of application hitherto unattainable in transistorized control circuits.

The common-emitter test circuit for the switching action is shown in Figure 2. Here, when switch S is thrown to its ON position, the collector current increases from a low value due to base bias E_2, to 13 amperes. With the 78-volt d-c collector supply voltage (E_3), this corresponds to 1,014 watts. Due to the small voltage drop across the transistor, however, only 8 watts are dissipated by the transistor. The d-c base-input power for this operation is only 1 watt, which indicates that the base-to-collector power gain is approximately 1,000, or 30 db. Lower amounts of collector-circuit power may be switched at lower levels of collector supply voltage E_3.

The switching time of this circuit is stated as 60 microseconds, roughly the period of 16.67 kc. The most significant limiting factor with regard to switching time is collector capacitance.

High-powered transistor switching will find applications where switch contacts in the power circuit must be eliminated, large control power amplifications are desired (thus, the switching circuit becomes a relay without moving parts), or when the power circuit is to be switched by means of suitable pulses.

Unijunction Transistor

A promising new semiconductor device is the unijunction transistor, formerly called the double-base diode. The commercially available unit is General Electric's 4JD5A1 shown in

Figure 3(C). In this unit, separate leads provide ohmic contact with each one of a silicon bar. This corresponds roughly to two base leads. A p-n junction is created at the center of the bar and a third lead is connected to this junction.

Figure 3(A) shows bias connections to this double-based junction diode. The junction is dc-biased in the forward direction by voltage E_1. A potential gradient is established along the length of the bar by voltage E_2. Because the junction is forward-biased, it emits holes into the n-type bar.

If E_1 and E_2 have the proper ratio, the potential distribution along the length of the bar and the polarity of its ends will be such that, when switch S is closed, the p-n junction acts as an emitter over its lower half and as a collector over its upper half.[1] This simultaneous injection and collection of carriers at the single p-n junction imparts a negative input resistance to the device. This is due to the shape of the voltage distribution along the length of the bar under these circumstances. Figure 3(B) illustrates the negative resistance characteristic. Note that as the input current is increased, the input voltage drop first rises from a to b. Then as the current is increased further, the voltage falls to c. Beyond the latter point, further current increase causes the voltage again to rise, but more slowly, to d. The region between b and c, having a negative slope, represents a negative resistance, while slopes a-b and c-d correspond to positive resistances.

The b-c region is necessarily unstable and will provide monostable operation, if desired. However, if external circuit resistances are so chosen as to establish the load line shown by the dotted line, bi-stable operation may be obtained. The operating point thus can be flipped from x to z, or from z to x, being unable to remain at the unstable point, y.

These monostable and bi-stable properties suit the unijunction transistor to oscillator, multivibrator, and switching circuits having considerable simplicity. Figure 4 shows circuits of a sawtooth oscillator and flip-flop employing the 4JD5A1 unijunction transistor. Note the economy of components. Similar applications have been described in the engineering literature.[2,3]

By means of suitable manipulation of the d-c load line, the unijunction transistor may be made to operate as a monostable, bi-stable, or free-running device. This provides an intriguing active element for various cir-

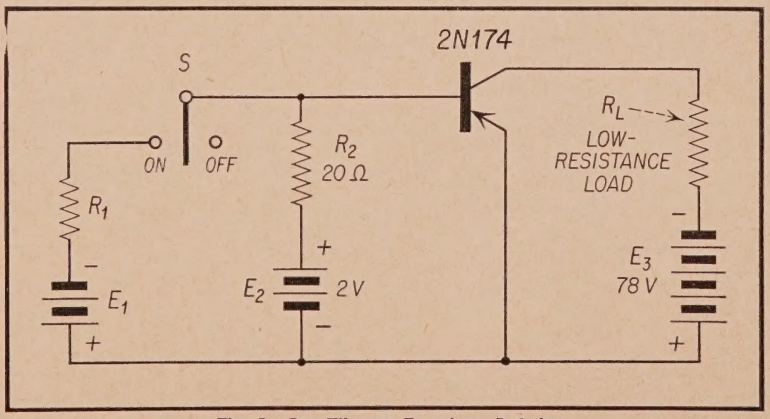

Fig. 2. One-Kilowatt Transistor Switch.

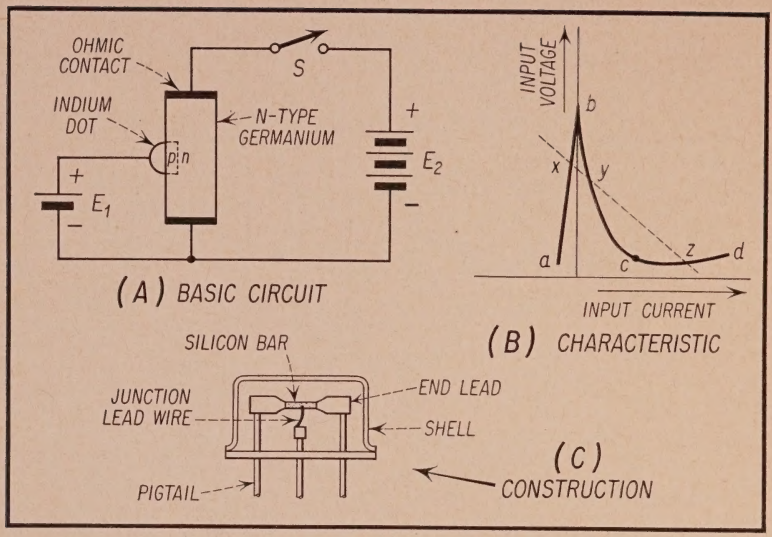

Fig. 3. Unijunction Transistor.

cuits. This device is essentially a 3-terminal component with an N-type negative resistance characteristic between its junction (emitter) and base terminals.

Maximum ratings of the 4JD5A1 are: Interbase voltage (E_2 in Figure 3-A) 45 v, interbase power dissipation 250 mw, emitter current 50 ma, and forward emitter resistance (at interbase voltage of 10 v) 100 ohms.

Bi-Directional Transistor

Bi-directional gain is of interest in such circuitry as detectors, clamps, and modulators. A small semiconductor device having this property is readily applicable to translator and computer circuits in which a large number of such components must be installed in a small space.

The GT-34S germanium pnp transistor (General Transistor Corp.) provides usable bi-directional gain. The tabulation below shows its characteristics.

High-Frequnecy Tetrode Transistor

A new npn germanium tetrode transistor (General Electric 3N30)

Parameter	Base-To-Collector	Collector-To-Base
1. Collector Voltage	-25 v max.	-25 v max.
2. Dissipation (50°C)	70 mw max.	70 mw max.
3. Junction Temperature	85°C max.	85°C max.
4. Collector Cutoff Current	15 ua max.	15 ua max.
5. Collector Resistance	1.5 meg avg.	1.5 meg avg.
6. Base Resistance	1,000 ohms avg.	1,500 ohms avg.
7. Beta	15 avg.	15 avg.
8. Noise Figure	12 db avg.	12 db avg.
9. Power Gain	32 avg.	32 avg.

Parameters 5 to 9, inclusive, are with $v_e =$ —4.5 v, $i_e = 1$ ma, and $f = 1$ kc.

produced by the meltback process provides amplification up to 120 Mc, and operating as a 110-Mc r-f oscillator delivers 10 milliwatts output. In pulse circuits, the output pulse from this tetrode has rise and fall times of 25 milli-microseconds and a width of 70 milli-microseconds. In a 30-Mc i-f amplifier, 3N30 tetrodes provide 70 db power gain at 3 megacycles bandwidth.

In a 6-stage 45-Mc television i-f amplifier, 3N30's have provided 57 db gain at 4 Mc bandwidth. And in a 2-stage video amplifier employing 3N30's, 33 db gain has been obtained between 30 cps and 10 Mc.

This transistor makes transistorized tv i-f, r-f, converter, and video amplifiers entirely feasible. It also opens new possibilities for the transistorization of radio frequency test instruments such as signal generators, heterodyne frequency meters, marker generators, grid dip oscillators, and miniature transmitters.

Additionally, this tetrode has been completely successful and equal to tubes in tuned-line oscillators, linear pulse amplifiers, driven blocking oscillators, regenerative pulse amplifiers, free-running multivibrators, r-f amplifiers, high frequency converters, and electronic switches.

Figure 5 shows the symbol of the tetrode transistor. The following are the maximum ratings of the 3N30:

Voltages	
Collector to Base 1	7 v
Collector to Base 2	7 v
Collector to Emitter	6 v
Emitter to Base 1	2 v
Emitter to Base 2	3 v
Base 1 to Base 2	3 v
Currents	
Collector	20 ma
Base 1 to Base 2	2 ma
Power	
Collector	50 mw
Base	5 mw

Figure 6 shows the circuit arrangement of a tetrode-type free-running multivibrator due to Aldridge.[4] This arrangement has been operated at a maximum frequency of 1¼ megacycle. The output voltage at 750 kc is reported as 10 v, and the rise and fall time of the output pulse as 0.3 microsecond. Such applications as this offer considerable promise for applications in frequency standards, square wave generators, counters, and similar devices.

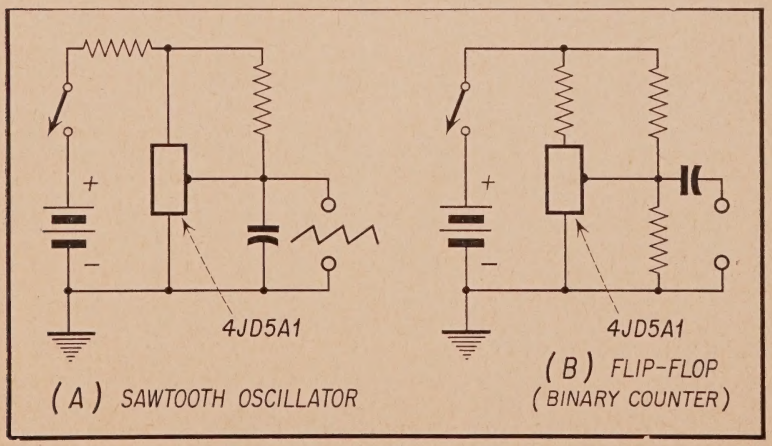

Fig. 4. Unijunction Transistor Circuits.

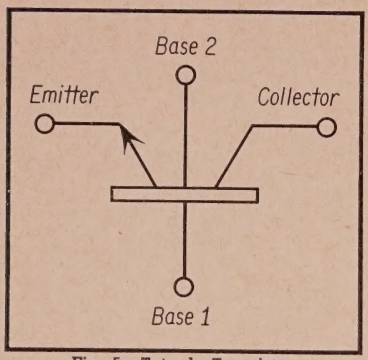

Fig. 5. Tetrode Transistor.

Additional Devices

In addition to the devices described in the foregoing paragraphs, the reader will find that many standard components such as low-power silicon junction diodes, germanium power rectifiers, medium-frequency transistors, phototransistors, and thermistors have undergone significant improvement during the past year. On many of these components, operating ranges have been extended and parameters made more stable. During the past year, several low-priced r-f—i-f transistors have been offered.

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1. Richard F. Shea, **Principles of Transistor Circuits** (New York, N. Y., John Wiley & Sons, Inc., 1953) pp. 466-470.

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3. J. J. Suran, **Low-Frequency Circuit Theory of the Double Base Diode,** IRE TRANSACTIONS (PROFESSIONAL GROUP ON ELECTRON DEVICES), April, 1955.

4. From a paper presented by C. A. Aldridge at the Transistor and Rectifier Clinic, October 2, 1956 (General Electric Co., Electronics Park, Syracuse, N. Y.).

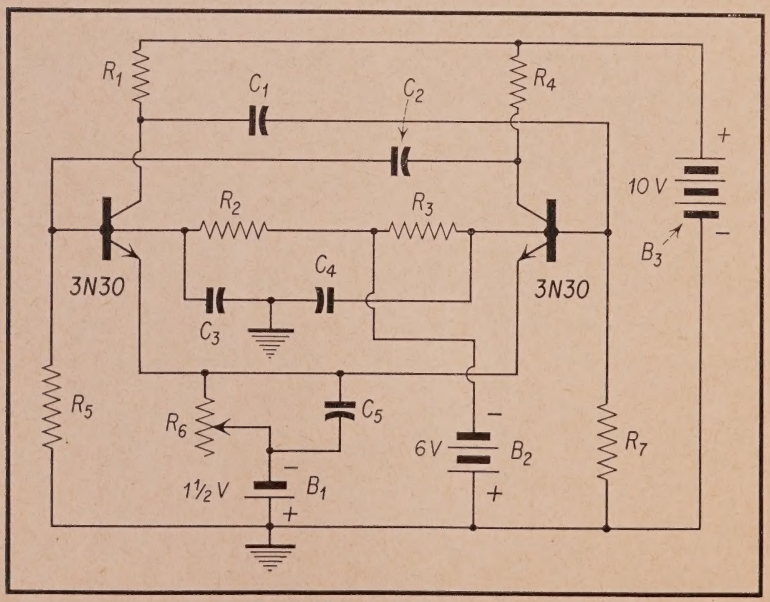
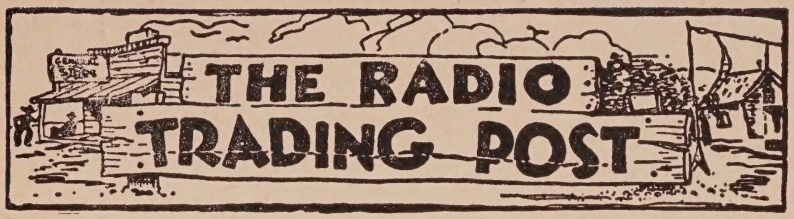


Fig. 6. Tetrode Multivibrator.



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FOR SALE — Sams 1 to 348, perfect condition, $375; Simpson 1000 Tube Tester, like new, $75. Harold Kroll, Box 117, Seymour, Wis.

WANTED — Audio engineering magazine of Feb., 1953. Will pay any charges. Edward Centille, 10804 Ave F., Chicago 17, Ill.

FOR SALE — Precision tube checker 10-12P like new, with all attachments, $75. Milton E. Wrenn, 1007 2nd St. S.E., Moultrie, Ga.

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SELL OR TRADE — 2-701-A transmitting tubes, $2; Hallicrafters S-38-C, $20; DM-34-D dynamotor with filter, $2.50; assorted xformers, condensers, chokes, 100 FA-9 type crystals. Will trade for ham gear. Ralph Miller, 7 Lorne St., Dorchester 24, Mass.

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FOR SALE — $440. Correspondence course in TV Studio Techniques, $175; Viking Ranger with xtal mike, like new, $225, or best offer. Frank Weber, 200 E. Main, Coldwater, Kan.

SELL OR SWAP — Phono amplifier with extra 117N7 tube completely wired and tested, $10 or swap for code practice records or code oscillator. Samuel J. Reed, 2020 E. Turney Ave., Phoenix, Ariz.

FOR SALE — NC183D like new, $295; Viking I & extras, $190; Meissner exshifter, $35; Millen 90651 grid dip meter, $45; ARC-4 like new, $35; KW antenna tuner, $40. George Van Kirk, 301 E. 20th St., Chester, Pa.

SELL — Heath AR-3 rcvr., Q-multiplier, $8; DB-20, $20; Alliance ATR rotor and control, works but looks used, $8; tubes and parts. FOB. Johnston, 305 Bickmore Dr., Wallingford, Pa.

SELL OR TRADE — 300 back copies of Service Dealer and Service, 12c each, or trade for parts or equipment. Alex Atkinson, 18231 Winthrop, Detroit 35, Mich.

WANTED — 1948 through 1956 Radio's Master catalogs — official buying guide of the industry; VHF TV booster. State price, condition. Emile Courcy, 15 Garfield St., Taunton, Mass.

FOR SALE — Heathkit AT-1 with AC-1 antenna coupler, both in exc. cond. $30; NC-125 (National recvr), $125. FOB. James Nelson, 2369 Oak Ave., Muskegon, Mich.

WANTED — RME DB23 Preselector. Curtis, Box 108, Terminal, Tex.

FOR SALE — Johnson Viking 2 transmitter, factory wired, with VFO, grid block keying, $250;; Johnson signal sentry, never used, $12; B & W coax transmit/rcvr switch, $15. John Elrod, 4007 18th St. NW, Washington 11, D. C. D. C.

SELL OR TRADE — Oak Ridge tube tester with operating instrs., adapters, pix tube adapter, and Speco signal tracer, all in working condition and with instruction book. Want $35 for both. J. Prezioso, 423 Fifth St., Niles, Ohio.

FOR SALE — Good used radio tubes: 6A7, 6A8, 6K7, 6C6, 27-41-76-75-77-84-24A-39/44. 25c each, postpaid. Ewell Churchill, Cord, Ark.

FOR SALE — Heathkit condenser-resistor checker, and linearity generator (both used slightly); Coleman 65,000 BTU natural gas wall furnace, used one winter; 0-400V DC power supply. Best offer. Lloyd's Radio & TV, Plainview, Neb.

FOR SALE — Heath TS-4 Sweep Gen. calibrated and checked by factory, $37.50; Riders TV vol. 5, $7.50, both FOB. F. Olson, 3556 Lime Ave., Long Beach 7, Calif.

WANTED — Acrosound TO-330 output trans. send best price first letter. Lakeside TV, Riverdale, No. Dakota.

WANTED — MB-40SL for cash; also pair filter chokes UTC S-37 and -38. A. R. Marcy, 168A No. A1A Dr., Patrick AFB, Fla.

FOR SALE — Complete Radio and TV service shop. All or in parts. Neil Wanamaker, Hotel Kesmon, Philadelphia 7, Pa.

FOR SALE — Final amplifier, 100TH, with 2,000 v power supply, antenna coupler, Viking Ranger, Rig in inclosed cabinet. Complete $275. Frank Y. Kelson, 42 Hanson Pl., Brooklyn 17, N. Y.

FOR SALE — Complete amateur station: Globe King 500 with WRL VFO exell. cond.; SX-71 and tape recorder good cond. Best offer above $700. plus freight. C. F. Graham, Box 8, Beaumont Tex.

FOR SALE — Crestwood 400 and 401 tape recorder and amplifier in perfect cond. Terrific buy for $175. S. Epstein, 1611 Placid St., Philadelphia 15, Pa.

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WANTED — Audio oscillator. State make, model, and price. Mercury Radio, 433 So. Wabash, Chicago 5, Ill.

FOR SALE — All Heath: V6 VTVM with high voltage probe, $22.50; BE4 Battery eliminator, l. n., $25; TCI tube checker with CRT test adapter $28., other test equipment, parts, books. H. E. Pence, 10th Ave. South, Attalla, Ala.

FOR SALE — Sam's Photofacts, binders, file cabinet; Hickok 209 VTVM; Jackson CRO-2 scope; Precision 10-12 tube testers, other good testers and service info., make offer. Carl Higgins, 105 Grace, Coffeyville, Kan.

FOR SALE — Radioplane control equip., including rcvr, control amplifier, gyro, selsyns, cabling, and diagram. All like new, $50. York Marine Radio, Stonington, Conn.

FOR SALE — DeJur TK20 tape recorder, including mike, etc., used few times for demonstration, $275; Ampro 756 tape recorder like new, $125. Carl Alsheimer, 111 Main St., Watervillle, N. Y.

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SELL OR TRADE — Auto and refrig. hand tools, Triumph 351 multitesters, meters, misc. parts. Want all types of test equip. Roby's Swapmart, 2422 N. Halsted St., Chicago 14, Ill

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FOR SALE — Hickok 533 tube tester in excellent cond., tests all latest tubes, $50. John Erdman, Webster, S. D.

FOR SALE — NRI radio communications course, very reasonable. Joe Mazik, Wading River, L. I., N. Y.

FOR SALE — Heathkit: T-4 Sweep gen., needs align., $40; T-2 sig. gen., $20; V-6 VTVM, perf. cond., $20; Knight in set capacitor checker, $10; plus shipping. Joseph C. Locascio, 1132 Mandeville St., Flint 3, Mich.

FOR SALE — Radio and TV service shop, well established and equipped in town of 20,000. Terms arranged. G. J. Paris, Box 438, Greenwood, Miss.

WANTED — Gonset Commander transmitter. Will pay cash or trade for other mobile equip. R. T. Graham, 24 Cherry Ave., Stoneham, Mass.

WANTED — Latern slide projector; VOM; pair citizens or marine band xceiver; antenna booster; adding machine; AC generator; 6 v. to 110 AC inverter; capacitor (induction) burglar alarm system. S. Krzak, 65 Main, Pawtucket, R. I.

TRADE — 3" Dumont scope; Hallicrafter 30-50 Mc. rcvr; Lady Smith revolver. Want wire recorder Bench saw, Jointer-Key Machine. W. H. Norman, 112 Douglas Ave., Rockwood, Tenn.

FOR SALE — 100 w. 829B 2-meter xmtr complete, Unit in 3' rack with metering of all stages on 5 separate meters, pair of 832-A drive 829-B to full input. Best offer. Frank Scaglione, 111 Stuyvesant Ave., Jersey City 6, N. J.

FOR SALE — $150 takes hundreds of tubes, components, several Radio-TV instruments; schematics, 3-way Webster with diamond sapphire needle, 15" Hi-Fi speaker, other articles. A. Remer, 1175 Gerard Ave., New York 52, N. Y.

FOR SALE — Pickering arm 190D, $25; Pilot 3" TV, $35; Bing No. 5 typewriter as is, $5; Jensen blond corner cabinet, $75; Hallicrafter SX42, $195; 2,000 volt transformer, two chokes UTC, $35. A. R. Dayes, 29 Charles St., Merrick, L. I., N. Y.

SWAP — Radio & TV tubes; Will sell AB Dick 77 hand-operated mimeograph machine $20; Todd checkwriter for bank size checks, $5; UHF converter unit adaptable for Philco TV, l. n., $8. Andrews, 740 Maple St., Bethlehem,Pa.

WANTED — Two-speed Crescent tape recorder, must be bargain. L. Woodall, 3811 Dempster Ave., Dallas 11, Tex.

FOR SALE — Mobile transceiver: 40 w. Bendix, 75/80 meters, power supply, cables, instruction book, $65 — 24 v. or may be converted to 6 or 12 v. Van Merritt, Campbell, Mo.

FOR SALE — Eico 221 VTVM, $20; Weston transconductance tube checker multimeter, $75; GE YGS-3 RF-FM-AF- xtal calibrator sig. gen., $100; deluxe Vibroplex bug, $18; Heath Q-multiplier, $10. Forrest Shanks, 38533 31st Street East, Palmdale, Calif.

WANT — RBB-1 Navy surplus rcvr and/or CRV-20130 power supply and connectors for both. Also Supreme 546 audolyzer. Donald Cameron, 1619 Milburn, Toledo 6, Ohio.

FOR SALE — BC 348Q modified for amateur use built in power supply, S meter, noise limiter, Harvey-Wells TBS50A, power supply, unused PE 103 crystals, Electro-Voice 950 Cardax mike — The works $150. S. M. Dinsmore, 140 Hacker Rd., Dayton 5, Ohio.

WANTED — Hallicrafters SX-16 or SX-17 Super Sky Rider receiver and speaker. Must be in excellent cond. State cash price expected. A. V. Tronske 401 West Ave. 43, Los Angeles 65, Calif.

SELL OR TRADE — Racing homing pigeons for UHF converter, short wave converter, tubes, or anything pertaining to radio or TV servicing. Dennis T. Willis, 1404 So. Jackson St., Tucumcari, N. M.

WANTED — Self-supporting tower, at least 60' high, base not over 15'. Prefer galvanized 4-leg job. Fred L. Kost, 431 Flamingo St., Philadelphia 28, Pa.

SELL OR TRADE — Heathkit 0-5 scope, little used, excellent condition, $25, or trade for FM tuner in working condition. R. P. McClintock, 4325 Wyoming St., Kansas City 11, Mo.

WANTED — Ham gear, test equipment, power tools. Will trade for clean 1938 Buick 4-door Special with orig. owners manual. Joseph Pastor, Jr., 391 Rochelle Ave., Rochelle Park, N. J.

FOR SALE — Complete mobile rig, $150; Gonset Commander xmitter, Morrow 3 BR converter with noise limiter, PE-103, Master mobile whip with mount and coils co-ax relay and all connecting cables. Dewey Baker, Naches, Wash.

WANTED — Supreme Manuals 1942 through 1954. Dillon Electric, 65 Washington St., Gloversville, N. Y.

WANTED — Riders TV Manuals 13 14, & 15. Quote prices. Philip Wilk, 383 E. 138th St., Bronx 54, N. Y.

WANTED — B and W Model 503 VFO power supply. F. W. Jones, Gabbs, Nev.

SELL OR SWAP — Winchester 52 HB with Supertargetspot 15X scope, palm rest, carrying case, and extra clips, excellent cond. for DX100 or Collins 75A1, 75A2 in good cond. or make offer. Raymond Nether, R. 1, Cheswick, Pa.

WANT — May '50, Dec. '52 QST. Have to trade or sell: Dec. '48, '49, '51; July, Nov. '53; Jan., Mar. '54. Also want MB-40SL or MB40L. Swap for 813s? P. Bittner, 55 East Crystal Lake Avenue, Crystal Lake, Ill.

WANTED — Socket connection continuity and tube tester No. 534 — set-up necessary to construct Hickok CRT adapter No. 1050-28. F. Jansen, 201 12th St., W. Babylon, L. I., N. Y.

WANTED — RTT equip., good 10-20 Beam-Tower. Leo Meister, 5 Highfield Lane, Nutley 10, N. J.

FOR SALE — ART-13 parts. Specify part number wanted. John W. Cale, Norwood, Mo.

FOR SALE — Wilcox-Gay Imperial 686 tape recorder; Precision series E-200-C sig. gen., $50; Pilot FA-540 basic FM-AM tuner l. n.; Garrad RC-88-4 speed record changer. Make offer. Also have antique 1920 radios. Wegrzynowski, 51 No. Central St., Buffalo 12, N. Y.

FOR SALE — Tubes, perf. cond., 813's $7.50, 810's $7.50, 832A's $4.00, 811A's $3.00, 829B's $5.00. SCR-522 power supply $12. complete Bogen Intercom, 6 stations $50. AN/PDR-8C navy geiger counter original cost $700. Sell $150. or trade. Bill Slep, Ellenton, Fla.

FOR SALE — CC5-50 Tecraft 6-m. converter, $16.50 FOB. P. Boothroyd, Box 142-G, Sparta, N. J.

SELL OR SWAP — Best offer. Two Raytheon voltage stabilizers, (regulators) 750 watt, 90-125v, 60 cy in 115v out. slightly used. Can use Ham equip., tape recorder. Louis G. Maxwell, 1016 Richard, Carlsbad, N. M.

SWAP — Meters, boosters; motors; gas engine; cent. clutch rectifiers; Hallicrafters S38 cap. analyzer; solenoids, relays. Need Preselector instruments, Brass or reed. Thomas Rohland, RR 3, Martinsville, Ind.

FOR SALE — Coil sets for Hallicrafter HT17 transmitter,. Send stamped addressed envelopes for price list. Jerry Tannenbaum, 5240 S. Harper, Chicago 15, Ill.

WANTED — Tape recorder of good make in good cond., will trade Smith-Corona typewriter in excellent shape, or ? Karl G. Muck, R. 2, Warsaw, N. Y.

FOR SALE — Starrett surface gage No. 257A cost $8.80 sell for $5.00. Lufkin Rule Co. No. 1911V micrometer graduated for measurement by ten- thousandths up to one-inch cost $16. Sell for $10. Both like new and FOB Emil Backstrom Jr., 5235 No. Winthrop Ave., Chicago 40, Ill.

WANTED — 2C39A tubes; sig. gen.'s, "APR" rcvrs, ARC-3; Hewlett-Packard and other lab. equip., Weston instruments, manuals for cash or swap Zenith transistor portables. Littell, Farhills, Box 26, Dayton 9, Ohio.

WANTED — Masco-MTB-13X booster $5; 3-speed record player, $10; 10" Sylvania TV; 6½ x 8½ King View camera, Bausch Lomb f.4 lens, $20. Need electronic flash unit, plus Reflex or 35 mm. camera. Stephen T. Bobo, Route 1, Northampton, Pa.

FOR SALE — ATR auto radio A battery eliminator, EL 1A, 115 VAC in, 6.3 VDC out, 6.5 amps, $12; Sams folders 1 to 28 in A1- cond., $15 plus shipping, or will ship express. Frederick R. Shutt, 612 Frantz Ave., Mullens, W. Va.

TRADE — Have fluid centrifugal pump, compressor unit,, instruction manuals, electronic. Need test equipment, Sams, etc. Owen J. Murray, 9 Iroquois St., Staten Island 5, N. Y.

SELL OR SWAP — Eico 425 scope with voltage calibrator; 625 tube tester; 22X telescope; Heathkit TV align. gen.; Emerson 569 portable with AC power pack. Want 20 x 50 binoculars with CF and resistor file cabinet with resistors. Carl Nester, Van Meter, Pa.

WANTED — Cash or trade TV cabinet for 21" 630 chassis; Hi-Fi system, complete with speaker and crossover network and binaural amp. E. Duggan, 25 So. Serven St., Pearl River, N. Y.

SWAP — Radio tubes, test equipment, vibrators, radio books, radio mags. — some over 20 years old. Want portable typewriter, state make, age, and price. Ed. Chinski, 1042 S. Lincoln Ave., Kankakee, Ill.

FOR SALE — 300 assorted ½, 1 watt resistors, $3; 25 assorted potentiometers with shafts, $2.50; 20 assorted bathtub condensers $2; 20 1,000 volt condensers, $2. P Berge, 39 Shelter Hill Road, Plainview, L. I., N. Y.

TRADE — Electro voice dynamic mike Stromberg-Carlson chassis, 550 to 1700 kc, 42-50 & 88-108 mc 10 watts for model airplanes and boats, RC equip., motors, good comera. E. DeColbert, Jr., 609 Henrietta St., Gillespie, Ill.

FOR SALE — NC101X rcvr 160-80-40-20-10 meters, S meter, automatic plug-in coils, permanent calibration, AVC CW oscillator, crystal filter, 10" spkr. Best offer over $75. Joe Ashley, 410 Riverbend, West Monroe, La.

SELL OR TRADE — 300 radio-TV standard brand tubes, original cartons; Sams 1 thru 5; Rider 1-5 abridged thru 14, except 12; antique radios; model T parts. Want: antique auto items; old U. S. coins. Harold Garrett, 711 South New York, Sedalia, Mo.

FOR SALE — Rek-O-Kut Chalenger disc recorder. PA and playback 78 and 33⅓ rpm — perfect cond. except spkr, converted arm with GE cartridge and diamond and blank discs. Best offer over $200. Fred Sibley, West Medway, Mass.

FOR SALE — Viking II xmitter, Johnson matched VFO, factory wired, push-to-talk. Make reasonable offer. Freedman, 3 Channel Dr., Great Neck, L. I., N. Y.

FOR SALE — Kelsey 9 x 13 printing press, excellent condition. Want good tape recorder and 2 meter mobile receiver. Clyde Keeler, 66 Franklin St., Port Jervis, N. Y.

WANTED — Recent radio correspondence course with or without kits. Send full particulars. Joseph Kaufman, 114-52 226 St., Cambria Hts. 11, N. Y.

FOR SALE — 13KV neon transformer $6.50; Millen 92101 pre-amp $12.50; set 500 w. inductors 10-15-20-80 TVL with base; swinging link & var cond. TCD210L $18.50; Elmac AF67 2 yrs old $65. All FOB. Robert Schmauss, 3903 Swann Ave., Tampa, Fla.

FOR SALE — Sams Photofacts 1 thru 210, good cond., in binders $150; Eico 315 sig. gen. perfect $25; Sylvania tube tester 219, good cond., $35; Waldam ten-tenna DA, new cond., $45. J. H. Wyatt, Box 221, Judsonia, Ark.

FOR SALE — Heathkit QF1 Q multiplier wired and A1 with manuals. Want to buy 6 meter xmitter, power supplies, modulators of various sizes, factory equip. at reasonable prices. Ward L. Lantis, Rt. 3, Skyline Dr., Kingsport, Tenn.

SELL OR TRADE — Home made phone amplifier less spkr. in perfect working cond. and extra 117N7 tube for $8.50 or ARC-5 rcvr in 80 meter band unconverted or converted. Will pay shipping on amplifier. Samuel J. Reed, 2020 E. Turney Ave., Phoenix, Ariz.

SWAP — Like new Sprague KT1 Kwik Test capacitor checker for 6 and 12 volt battery eliminator. Alfred T. Jutkiewicz, 50 Addison St., Chelsea 50, Mass.

FOR SALE — Complete mobile station: 28 watts with xtals, mike, whip ant., PE-103 dynamotor, Gonset 10M converter $70; also 90 w all band AM-FM-CW trans. with LP fiter $90. Jerome Hammerling, 30-34 83rd St., Queens, N. Y.

FOR SALE — Emerson 3-way portable radio, excellent cond., red plastic case, $8; Philco auto radio, excel. cond. $5. Both COD. John Kozma, 12450 NW 5 Ave., Miami 50, Fla.

SELL OR TRADE — Hickok 630 TV voltage calibrator and 600A tube tester; Philco VHF to UHF signal generator adaptor. All first class cond. with instruction manuals. Cash offer or tape recorder or Deck. Marv Davidson, 8534 Wilshire Blvd., Beverly Hills, Calif.

WANTED — Aluminum or wooden canoe or small boat. Have SCR-522 VHF transceiver with rack and dynamotor. Bill O'Brien, Jr., Bob 367, Pilot Point, Texas.

FOR SALE — RCA AVT-49 2-14 MC xmitter, 80 watts to 3E29, phone $25; Sterio Realist 35mm camera $90 with case and filters K. M. Miller, 14979 LaCumbre Dr., Pacific Palisades, Calif.

WANTED — For cash Army TM11-866. Seymour B. Kramer, 2851 Sedgwick Ave., Bronx 68, N. Y.

WANT — RME model 100 speech clipper. State price. Dom DeVito, 57 Bracewood Lane, Stamford, Conn.

WANTED — Millen 90651 Grid Dip meter and manual. William Sharkey, 42-66 Phlox Pl., Flushing 55, N. Y.

WANTED — Grid Dip oscillator, prefer Heathkit. Will buy or trade surplus, tubes, radio and TV parts or what do you want? I. P. Chipman, 2027 N. Park Ave., Tucson, Ariz.

SELL OR TRADE — Precision 612 tube and battery tester l. n. $50. or swap for 50-75 w. commercial phone transmitter, VFO controlled. Mike Yacenich, 105 Elm Dr., Trafford, Pa.

SWAP — Printed advertising matchbooks for electronic items such as tape recorder, rcvr. or ?? Dick Lack, 2029 Bradley, Chicago 18, Ill.

FOR SALE — Zenith transoceanic portable radio, about 10 years old, excellent cond., $25, less batteries; oil capacitors, 3 mfd 2,000 v. $2, 2 mfd 1,000 v. $1; S53 rcvr. $60. Geo. Colacicco, Rt. 31 Bx. 400-D White Rd., San Jose, Calif.

SELL OR SWAP — NRI Electronic meter, reads voltage, ohm and current; NRI Radio & TV course, No equip.; Television & Radio Repairing by Markus. A. Casario, 2220 Wallace Ave., Bronx 67, N. Y.

FOR SALE — Misc. amateur equip., parts, tubes, and test instruments. D. W. Langston, T-365 Camp Green Bay, Great Lakes, Ill.

WANTED — 3" scope in good cond., sweep and RF sig. gen. and transoceanic radio rcvr for reasonable price. H. Chasen, 343 East 55th St., Brooklyn 3, N. Y.

WANTED — QST for February 1935. Will pay any reasonable price. Doc Waters, 402 D Ave., Coronado, Calif.

WANTED — Used 3 or 4 speed tape recorder. Alvin W. Lundquist, 3331 Pierce St. NE, Minneapolis 18, Minn.

WANTED — Heath DX100 or Viking No. 2 transmitter. Will pay cash. Jos. Barry, 105-08 133rd St., Richmond Hills 19, N. Y.

WANTED — FM radio, old time gramaphone, old records of Caruso, etc. Will trade radio-TV magazines, record books, band photos, tubes and speakers. H. Kuell, 18½ Thomas St., Newark 5, N. J.

FOR SALE — Two 6 volt dynamotors: 350 v at 150 ma and 200 v 75 ma; Two 6v field cone speakers: 14" Jensen Auditorium and Jensen 12". A. Stratmoen, 225 Irvin St., Lock Haven, Pa.

FOR SALE — Like-new Sprague Kwik-Test KT-1, $20; Kirby 98 fly-back transformer tester 98, $22.50. C. Soest, 12092 Kilbourn, Detroit 13, Mich.

WANTED — RCA tuner KRK 9 w/tubes. preferably new. Also GE 811 tuner. Have Riders manuals, books, tubes, 7" pic tubes. Truch's 290 Main St., Spotswood, N. J.

FOR SALE — Pair of Eimac 304TLs, in original cartons, with one new tube socket, $15. Donald Klein, Chaplin, Conn.

FOR SALE — Webcor 3-speed changer with GE magnetic cartridge, $23. 12" PM speaker in walnut wall baffle, $5. perfect 1LN5 tubes 75c each. John P. McCullen, 3050 Bainbridge Ave., Bronx 67, N. Y.

FOR SALE — Two BC-222 xmitter-receivers, approx. 25-60 mc. Need slight repair — antennas, tubes, schematic; less batteries. Make sensible offer for one or both. B. J. Desind, 2458 Shirley Ave, Baltimore 15, Md.

FOR SALE — Unused 12 v., 50 amp gen. Will ship anywhere, express collect, $12.50. Murland D. Fransisco, 4234 Woodworth St., Holt, Mich.

FOR SALE — Presence amplifier, 6SG7, 6SN7, 2-6V6's. Separate adjustable power supply chassis. Pick up only. $12.50. Howard Radio, 727 E. 10th St., Brooklyn 30, N. Y.

FOR SALE — Zenith auto radio, good cond. lacks spkr. $14. Cordova, 133 Watkins St., Brooklyn, N. Y.

FOR SALE — Johnson Viking VFO Model 122 used ½ hr. $35; Miller Grid Dip meter $35; Jones Micro Matic with standing wave meter coupler unit for 52 ohms $30. Mrs. Walter Haeussinger, 1102 Marian St., Winona, Minn.

FOR SALE — Sams Photofacts Vol 1-2-3-7, no binders, good cond. $12. plus shipping. Modern Electric Service, 117 East Bellville St., Marion, Ky.

SELL OR TRADE — Meters, mikes, xtals, phones, xfmrs, chokes, rcvrs, xmtrs, disc recorder, Canon cameras, etc. Indicate needs, and offers. Bob Townsley, 5919 Almaden Lane, Oakland 11, Calif.

SELL OR SWAP — Turner dynamic 33D mike; Heath Q multipler $9; 2-2E26 tubes; Coronado auto radio (2 unit); odds and ends from BC-375 basic unit of Novice 6L6 xmtr, ess xtal and tube. H. F. Berkshire, Lanark, Ill.

FOR SALE — Halladsorn 35 w. amplifier kit complete with tubes except spkr. $25; Lindstrom Violet Ray & Massager 110 VAC with violet ray electrodes, sacrifice $25. FOB. A. A. Gostino, 223 S. Winebiddle Ave., Pittsburgh 24, Pa.

FOR SALE — Standard 25 w. amplifier in kit form complete with tubes except spkr. $18. A. Palmo, 223 S. Winebiddle Ave., Pittsburgh 24, Pa.

FOR SALE — Radio-TV books, tubes, parts, Photofacts, test equipment, good radios. McArthur, 1316 Mt. Vernon, Colton, Calif.

FOR SALE — Knight in-circuit capacitor checker. New cond. $5. H. Gehring, 1200 Stockwell, El Paso, Texas

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FOR SALE — Measurements Corp. 78 FM signal gen. $50; RCA TV crystal calibrator 39A $50; Kay megasweep $125; Riders radio manuals 1-5 abridged 6-15 $35; Precision CRT CX30 tester $40. V. Iavarone, 1218 Leland Ave., New York 72, N. Y.

FOR SALE — Heath TS-4 Sweep gen., $42.; and OL-1 Scope, $24.; Arkay sig. gen. $10.; all 1. n. and attachments for each. W. D. Barnes, 687 Robertson Rd., Churchville, N. Y.

FOR SALE — Ten-foot bench, complete with over 14 Heathkit instruments, plus office desk & chair $600. Write for details. Robert Greenwood, 3158 Clive Ave., Eddington, Pa.

WANTED — Hickok 640 and 770 scopes and all late Hickok test equip. For sale Hickok 288X sig. gen., $100. Paul Capito, 637 W. 21 St., Erie, Pa.

FOR SALE — Supreme 576 sig. gen. for $45, used once; Heathkit aural signal tracer, $20. Christian Schlatherbeck, 16 Clinton St., Binghamton, N. Y.

FOR SALE — Elmac A54-h mobile-fixed xmtr, Gonset 3-30 converter, Gonset noise limiter $115. Ray Wilson, 117 W. Broad St., Telford, Pa.

SWAP — Supreme 504-B tube & set tester for good rifle or novice amateur gear. K. Radziewicz, 846 Bergen St., Newark 2, N. J.

FOR SALE — 94 Lesson course on Radio and TV by Sprayberry Academy of Radio. Best offer plus postage. John Hrinda, 1379 Stewart St., Northampton, Pa.

WANTED — Police alarm rcvr in good cond. Send cost and other details. Martin Boxenhorn, 2946 W. 27th St., Brooklyn 24, N. Y.

FORCED TO SELL — account of health — fully equipped Radio -TV Repair Shop. Living quarters attached. Morgans Radio and TV, 1448 Liberty St., Jacksonville, Fla.

WANTED — Hi-Fi player, disc recorder, FM 30-50 set, records and hobby collectors of records, record mags. Have tubes 5678, 957's, spkrs., radio 16 mm. film, audio meter records. H. Kuell, 18½ Thomas St., Newark 5, N. J.

TRADE — G.I. single speed recording turntable, magnetic cutter, phono arm, portable case; Alex Hamilton business course 24 vols.; wireless phono oscillator. Want photo equip., VOM or machine tools. F. Fellows, Hillcrest Acres, Cambridge, Ohio.

WANTED — Ham gear: rcvrs, xmitters, tubes, mikes, keys, power xformers, head phones and meters. State lowest price possible. Ira Kraemer, 899 18th Ave., Newark 6, N. J.

TRADE — Eico 566 1,000 ohms/volt multimeter, for 1½ v. battery eliminator. Dewey Altizer, R. 1, Centerburg, Ohio.

FOR SALE — Simpson 260. Needs repair, $12. plus postage. Hy Levine, Box 904, Liberty, N. Y.

FOR SALE — C-D 6R5 Power Con converter, 6VDC, 110 VAC, 50-55 w., $10; Brush BA106 non-directional xtal mike, $8; Chicago 6534 nuclear geiger counter, $10. All items, excellent cond., shipped FOB. Edwin L. Horacek, Route 2, Box 117, Yankton, S. Dak.

WANTED — German radio tube DL11. Lee Andrews, 957 E. 3rd St., Erie 3, Pa.

FOR SALE — Heath AT-1 in perfect cond. $20. Dick Linder, 423 Columbus Ave., Brillion, Wis.

FOR SALE — Hallicrafter S-76 with built-in spkr., $89; Globe Scout 65A phone-CW transmitter, factory wired, $79; Heath VF-1 VFO, $15; Weston Analyzer, $25. All in perfect cond. F. McCabe, 612 S. Swinton, Delray Beach, Fla.

WANTED — Short Wave Craft magazines. Skeet Radio & TV Service, R-2. Centerburg, Ohio

SWAP — Complete TV Service equip., scope, sweep, tubes, etc., for ham rcvr and xmitter. Richard Clark, 1533 Edith St. NE, Grand Rapids 5, Mich.

SELL OR TRADE — 1625 Class AB2 modulator on 19" panel with modulator transformer and power supply for speech amp.; 15 w., 10 m. mobile xmtr from May '54 CQ. Need 7-10 amp. variac and F455B-08 mech. filter. R. M. See, 1708 E. Woodland, Ponac City, Okla.

FOR SALE — 813, 829B, 1680, 2C51, 3AP1, filament xfmr, 110 v. AC Pri-Sec. 10 v. and 6.3 VAC at 15 amps. 813 socket, 829B socket and many more. Write for list. Ernie Wolitzer, 2143 82 St., Brooklyn 14, N. Y.

FOR SALE AND WANTED — Practically new Eico 221 VTVM, exc. cond. Want Altec-Lansing ALC-101 tuner, less amp. and power supply, FM. Need not be working. Richard James, 1208 E. Fairoaks, Peoria, Ill.

WANTED — Revere T-700D or TR-800D tape recorder. Eugene Kon, 1516 Broadway, Buffalo 12, N. Y.

TRADE — Perfect 5BP4 cathode ray tube for a key (transmitting). L. D. Ewy, 3216 S/W 65, Oklahoma City, Okla.

TRADE — 807 and 815 xmtrs table top; 2 meter 815 final with power; 5" disassembled scope-tube ok. Need HT9 xmtr, FB7 or FBX receiver, cash or what? Joe Anderson, 909W. Nevada, St. Paul 13, Minn.

SELL — Arkay AM-FM tuner, Grundig-Majestic 2065 receiver, Radio Craftsman RC-2 amplifier, Heathkit WA-P2 Preamp. Electro-Voice Aristocrat I, Rek-O-Kut LP-743 turntable. Want-Hysteresis turntable in excellent cond. Eric Beismann, Canajoharie, N. Y.

FOR SALE — ART-13 speech amplifier with spare driver transformer, bank of relays, Sylvania type monitor. All schematics included $38. B. Spiegel, 23 Walnut Ave., Floral Park, L. I., N. Y.

FOR SALE — Eico 315 sig. gen., $38; NRI Radio Course in 3 binder covers no kits $25; NRI Service Manual Vol. 1 & Supreme Radio Diagrams 1926-1938, $14. H. E. Wood, 1034 Pioneer Rd., Lansdale, Pa.

FOR SALE — Superior TV II tube tester like new, $30. B & M TV Service, 163-02 Hillside Ave., Jamaica 32, N. Y.

WANTED — Late model Mutual Conductance tube tester & 6-12 volt power suply with volt and ampere meters. Have test instruments or cash. Virgil Franceschini, 708 Bigler Ave., Barnesboro, Pa.

WANTED — Tape recorder, Hi-Fi equip. & ham rcvr in trade for Hickok 534 tube tester & VOM, RFO5 scope, 203 VTVM, Jackson sig. gen. Edward Sujak, 2526 S. 58 Court, Cicero 50, Ill.

SELL OR TRADE — Rek-O-Kut, V-16 turntable, 50 cycle motor; K-24 aerial camera, f2.5 Aero Ektar lens; Weston 301, 100 microamp meters; Speed Graphic camera, 2¼ x 3¼ complete with Heiland gun, pre-anniversary model. O. R. Hill, 1674 Morgan St., Mountain View, Calif.

SELL OR TRADE — Rider's Manuals 1-5 abridged, 6-21; PA Vol. 1 for Elec. typewriter and miscellaneous equip. or sell half price. J. F. Choate, 1701 Young St., Big Spring, Texas.

FOR SALE — Precision 612 tube and battery checker blond wood, portable, complete operating instructions, latest roll chart, $60; Eico 221 VOM with instructions, leads and high voltage probe $20. James P. Torre, 101-48 120th St., Richmond Hill 19, N. Y.

FOR SALE — Meissner secondary freq. standard 110 v. 60 cy push button control. $25.; BC-221 freq. meter with calibration book, 110 power supply built in case, best offer; DX-35 $50. William Moose, 12628 Kelly Rd., Detroit 24, Mich.

FOR SALE — Johnson Viking Adventure perfect cond. including original instr. manual. $50. Robert Resenquist, 922 Elm St., Apt. 1, Toledo 11, Ohio.

FOR SALE — Radio City Products 802 tube tester, $10; assorted xtals, meters, tubes and transformers. Send stamp for list. J. I. Robicheau, 97-37 63rd Rd., Rego Park 74, N. Y.

FOR SALE — Sam's Photofacts 169 to 210 inclusive, perfect cond. 85c each; 1954 Coyne Television Home Training Course. 100 Lessons in bound-books, $25. Both plus shipping charges. A. Dauer, 11 Melvin Ave., Bradford, Pa.

WANTED — Radio-TV test equip., kit or factory built type in repairable or working condition. Glenn Seaton, 14314 Ledgewood Ave., Cleveland 11, Ohio.

SWAP — Custom-built cintillation Counter very sensitive, retail value, $500, for professional quality tape recorder or name brand Hi-Fi equipment. Bray, 1384 Alamo, Memphis 14, Tenn.

SALE OR TRADE — Eico 950B comparator bridge tester; Alliance Casamatic bb2 booster; Silvertone UHF converter; RCP 704 sig. gen.; Rider's Vol. VII. C. J. Schexnayder, 200 Sheveport Ave., Port Arthur, Tex.

TRADE — Meissner analyst in good shape for tape recorder. Also trade RME 9-tube from 550 kc to 42 mc and Hallicrater S-47 with 15" Hi-Fi Triaxiel spkr. for good Collins Ham set or B & K 500 tube tester. S. P. Osborn, 519 East Federal, Drumright, Okla.

FOR SALE — 80 Radio & TV tubes boxed; RCA, G.E., Sylvania, Tungsol; 13 electrolytic condensers 150 to 400 v. Webster Pickup Feather Ride Model CX; 4 to 7" PM spkrs; Radio parts, motors, junk, full price, $40. Thomas Byrne, 331 Calhoun Ave., Bronx 65, N. Y.

SELL OR TRADE — 20 Tradio T-U 6 coin-in-slot hotel radios, 25c meters, in good cond. Original cost $1200. What do you offer? Brown Wilson, 2113 Polk St., Amarillo, Texas

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TRADE — Complete RTS radio-TV course less kits, for guns, radio parts, camera or ?? E. A. Sawyer, PO Box 346, Marshall, N. C.

FOR SALE — T1C Wobbulator model 1200 in perfect cond., contains 46 tubes, 26 crystals, for complete RF alignment, $250; Kay Megasweep, $100; E400, complete, $90. F. Saron, 844 E. 13th St., Brooklyn 30, N. Y.

SELL OR SWAP — Eico 625 tube tester, factory checked and chart up-to-date (5-30-'57), $20 or swap for battery eliminator 6 to 12 volts. S. A. Morse, 247 Moore St., Brooklyn, N. Y.

WANTED — Columbia 340 AM-FM tuners. B & B Electronic Service, Box 604, Taos, N. M.

FOR SALE — NC183D rcvr $175 and Meissner ex sig. shifter $25. Frank Waka, 144-21 79th Ave., Flushing 67, N. Y.

SELL OR TRADE — QST, 1937 to '51; Radio and TV News; two concert spkrs., 12" in carrying case; rotary converter, 32 v. DC to 110 v. AC. William H. Lorimer, 432 Sheridan St., Williamsport, Pa.

SELL OR TRADE — Auricon 16mm sound camera, 200 ft., latest viewfinder and amplifier; Inverter for car operation, all cables, etc., manual. Guaranteed, $400 FOB. Want Collins equip., Gonset 2-meter, & unicom communicators., M. L. Bardfield, 4 Brinsley St., Boston 21, Mass.

SWAP — M-12 and TR-12 Rek-O-Kut disc recording equip., for tape recorder, similiar to Magnecord m-30. Ernest Tucker, Box 25, Fayetteville, Tenn.

FOR SALE — Projection TV 27" x 36" screen, self-contained 20W, amplifier, 30KV PS, 630 circuit, spare 5tp4 $65; T23-ARC5 tubes, 4 xtals $15; 110AC to 110DC @ 5 amp. full wave rectifier $10. J. Wasiewicz, 74 Canterbury Rd., White Plains, N. Y.

WANTED — Tuner KRK8B for RCA—KCS47C chassis. Model 7T103 in good cond. or repairable, or KCS47B chassis, or parts. E. A. Lindsell, 94-34 239th St., Bellrose, L. I., N. Y.

SELL — FR Portaviewer $15; Argus 100 w. projector $8, 300 w $20. Kodak Flash Bantam camera $20. Want General Radio 1140A, 566A, 1209A. H. I. Grffiths, 39-82 65 Pl., Woodside 77, L. I., N. Y.

SELL OR TRADE — Xmitter, 300 w., Bud final T55's, balance homemade in two 5' racks, fully metered, 242A modulators, relay controlled, xtal exciter-doubler, $150 or trade for complete 75 meter mobile rig or ? Ralph L. Krause, Box 595, Hermiston, Ore.

FOR SALE — Onan 105AK1P gasoline electric plant, 1,500 w., with carrying frame. Never used. Blossomland Radio Assn., Inc., Box 292, St. Joseph, Mich.

FOR SALE — Electro-Voice 15w. spkr., $38, and X336 dividing network, $18; Browing RJ12 tuner and power supply, $60; Bogen DB20DF amplifier, $65; ACA100DC amplifier, cheap. Donald Keiser, Gladbrook, Iowa.

FOR SALE — 150 excellent 6-tube coin or key operated pillow spkr. radios with bed brackets, ideal for hospitals or motels. Any reasonable offer for all or part. P. S. Carter, 50 Quincy St., Sharon, Mass.

FOR SALE — 779A rcvr, RA84A power supply, 100 to 400 Kc., 2.5 to 20 Mc., like new, $160, or $175 in black 4 ft. enclosed rack. Z. Masoomian, 826 Preston Rd., East Meadow, N. Y.

SWAP — RTTA Radio-TV course with FCC exam; Eico 536 multimeter; Arkay sig. gen. SG-2 both 1. n. Want Rek-O-Kut trans. turntable 33⅓ or equal. State model and cond. Leonard F. Jones, 3202 Canterbury Dr., Greensboro, N. C.

SELL OR TRADE — National Schools, L. A., recent Radio-TV-Electronics course in good condition; some back issues QST from 1916, fair cond. Want stamp collections, Newfoundland, Canada, U.S., and mobile ham equip. Earl Monath, 272 Lilac Dr., Monroeville, Pa.

FOR SALE — Inverters: ATR-ISP — 32DC to 110 AC, 150 w; ART-RSC 110 DC to 110 AC, 250 w.; Electronic Lab. RV15 32 DC to 110 AC, 150 w., 1. n. choice $10 FOB Fargo, N. Dak. Mrs. Ray W. Jordan, Rt. 1, Detroit Lakes, Minn.

SELL OR SWAP — 200 ma Triplett 3" sq., $4; 10 v. DC 2" sq., $2.50; 5 ma 2" sq., $3; Guardian Relays. Want Dow Coax Relay and 400 DC ma sq. meter. P. Bittner, 55 East Crystal Lake, Crystal Lake, Ill.

FOR SALE — Precise 116-W Tube Tester, factory-wired, like new, $85; Approved A-100 sig. gen. $15; 20" pix tube, yoke, width coil, mask, safety glass, all unused, $25 FOB. V R. Hein, 418 Gregory, Rockford, Ill.

FOR SALE — UTC, LS-55 output transformer, $9; unused Fairchild hand grinder $5; Spring wound Instructograph 10 new tapes $10; Transformerless power Amp. $10. Kenneth E. Gould, 509 Vine St., Liverpool, N. Y.

FOR SALE — Gonset 3010 FM tuner, 40-50 mc perfect cond., $40. Joe Watford, North Shelfer, Quincy, Fla.

FOR SALE — Oscilloscopes, 7" Sylvania, guaranteed to be in perfect working order, $75. J. Goodman, 405 East 74 St., New York 21, N. Y.

FOR SALE — Bogen B-50 turntable with GE RPX-050 cartridge, 1. n. cond, used only for testing. Also other audio and test gear plus misc. items. Richard R. Haskey, 4232 No. 62nd St., Milwaukee 16, Wis.

SWAP — Eimac 750TL for what have you? Robert Cobaugh, 29-29 213th St., Bayside 60, N. Y.

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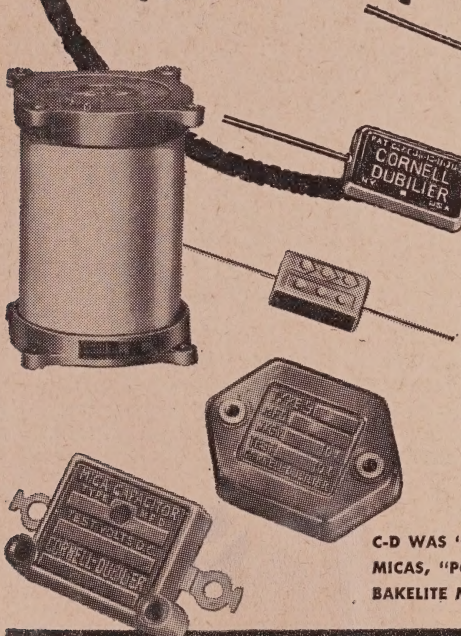

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